



Regulations for the B.Tech. in Computer Science and Engineering (CSE) Program

1. Preamble

IIIT-Delhi aims to encourage research and innovation in Information Technology (IT) and allied areas. The objective of the B.Tech. program in Computer Science and Engineering (CSE) is to prepare students to undertake careers involving innovation and problem solving using computational techniques and technologies, or to undertake advanced studies for research careers, or to take up Entrepreneurship.

In order to give due importance to applied as well as theoretical aspects of computing, the curriculum for the B.Tech. (CSE) program covers most of the foundational aspects of computing sciences, and also develops in students the engineering skills for problem solving using computing sciences.

Most engineering programs start with general courses in Sciences, and then migrate to specialized courses for the disciplines. While these courses are indeed foundational for many engineering disciplines, they can be treated as application domains (as is evidenced from the fact that most Sciences and Engineering disciplines heavily use computing now). Hence, the B.Tech. (CSE) program at IIIT-Delhi starts with computing oriented courses first, and allows the possibility of doing Science courses later. Besides being better suited for a CSE program, it also enables the possibility of students seeing newer applications and possibilities of using computing in these subjects.

With this approach, the B.Tech. (CSE) program can be divided broadly in two halves. The first half focuses on building the foundations, and is highly structured. The second part is for developing the skills and knowledge of the students in various topics – computing and application domains. This part also provides limited specializations, and different students may follow different paths and take different set of courses in it. Overall objectives of the B.Tech. (CSE) program are to help develop the following attributes in students:

1. Understanding of theoretical foundations and limits of computing
2. Understanding of computing at different levels of abstraction including circuits and computer architecture, operating systems, algorithms, and applications.
3. Ability to adapt established models, techniques, algorithms, data structures, etc., for efficiently solving new problems
4. Ability to design, implement, and evaluate computer based system or application to meet the desired needs using modern tools and methodologies
5. Ability to function effectively in teams to accomplish a common goal
6. An understanding of professional and ethical responsibility.

7. Ability to communicate effectively with a wide range of audience
8. Ability to self-learn and engage in life-long learning
9. Understanding and ability to use advanced techniques and tools in different areas of computing
10. Ability to undertake small research tasks and projects
11. Ability to take an idea and develop into a business plan for an entrepreneurial venture (if desired)
12. An understanding of the impact of solutions in an economic, societal, and environment context.

This document specifies the specific regulations for the B.Tech. (CSE) program – the general regulations for the B.Tech. program are given in a separate document. These regulations are in addition to the regulations of the B.Tech. program.

2. Program Structure

1. The Foundation program provides the basic knowledge about Computer Science (CS) through a set of core courses, which are compulsory for all students. This program consists of four major streams: software, hardware, theory, and systems. Besides these, there are courses in Maths, communication skills, environment studies also as part of the core program.
2. The set of core courses are shown in the table below (courses mentioned in [] are electives and actual courses for these slots are as defined from semester to semester.)

For students of 2020 batch onwards

SEMESTER 1	SEMESTER 2	SEMESTER 3	SEMESTER 4	SEMESTER 5
Introduction to Programming	Data Structures and Algorithms	Advanced Programming	Fundamentals of Database Management Systems	
Digital Circuits	Basic Electronics	Operating Systems	[Practical Bioinformatics/Prototyping Interactive Systems/Theory of Computation]#	Computer Networks
Maths I- (Linear Algebra)	Maths II- (Probability & Statistics)	Discrete Mathematics	Algorithm Design and Analysis	
Introduction to HCI	Computer Organization	[Math3, Signals & Systems, Embedded Logic Design, ..]	[Math 4, Graph Theory]#	
Communication Skills	[SSH]	[SSH]	[Science/BIO/..]	Technical Communication + Environmental Sciences

For students of 2019 batch

SEMESTER 1	SEMESTER 2	SEMESTER 3	SEMESTER 4	SEMESTER 5
Introduction to Programming	Data Structures and Algorithms	Advanced Programming	Fundamentals of Database Management Systems	
Digital Circuits	Basic Electronics	Operating Systems	[Human Computer Interaction/TOC]#	Computer Networks
Maths I- (Linear Algebra)	Maths II- (Probability & Statistics)	Discrete Mathematics	Algorithm Design and Analysis	
Prototyping Interactive Systems	Computer Organization	<i>[Math3, Signals & Systems, Embedded Logic Design, ..]</i>	<i>[Math 4, Graph Theory]#</i>	
Communication Skills	[SSH]	[SSH]	<i>[Science/BIO/..]</i>	Technical Communication + Environmental Sciences

For students of 2018 to 2015 batches

SEMESTER 1	SEMESTER 2	SEMESTER 3	SEMESTER 4	SEMESTER 5
Introduction to Programming	Data Structures and Algorithms	Advanced Programming	Fundamentals of Database Management Systems	
Digital Circuits	Basic Electronics	Computer Organization	Operating Systems	Computer Networks
Maths I- (Linear Algebra)	Maths II- (Probability & Statistics)	Discrete Mathematics	Algorithm Design and Analysis	
System Management	Introduction to Engineering Design	<i>[Math3, Signals & Systems, Embedded Logic Design, ..]*</i>	<i>[Theory of Computation, Math 4, Optimization,..]*</i>	
Communication Skills	[SSH]	[SSH]	<i>[Science/BIO/..]*</i>	Technical Communication + Environmental Sciences

*For these slots, a CSE student must do (i) TOC or a Maths course of 200 level or above (e.g. Math III or Math IV), and (ii) must do a BIO or ECE course at 200 level or above.

3. List of technical and non-technical courses in the first year

For students of 2019 batch onwards

Semester	Technical Courses	Non-Technical Courses
Semester 1	Introduction to Programming Digital Circuits Maths I Prototyping Interactive Systems	Communication Skills
Semester 2	Data Structures and Algorithms Basic Electronics Probability and Statistics Computer Organization	SSH Elective

4. The semester mentioned for the core courses is indicative and suggested, and they can be done later/earlier also. However, the pre-requisite requirements must be kept in mind by a student, if he/she wishes to do a core course in some other semester.

5. In the Engineering Science/Math course slots in second year, students can take only from the list of courses specified for those slots.

3. The Advanced Part and Streams

1. The rest of the program consists mostly of *elective courses*. An elective course is one which is not compulsory, and a student may have choices from which to select the courses he/she wants to do.

2. Some of the electives may be organized as *streams*, where a stream is a sequence of courses in an area providing a limited specialization in that area.

3. Besides electives and streams for specialized areas, streams and electives from domain areas (e.g. health, life sciences, finance, economics, E-Governance, sciences, etc.) may also be offered.

4. The number and nature of streams and electives will evolve and may change with time, providing the ability to accommodate the evolving nature of computing and its applications in the program. Some of the current streams are in these areas:

- Image Processing and Machine Intelligence
- Data Analytics
- Mobile Computing
- Security and Privacy
- Hardware
- Theory

- Finance
- Environment
- Economics
- Sciences (Physics, Biology)

Note: Streams in the UG programs will not be shown on the transcript. However, the students may be guided about the courses belonging to a certain area during the course counseling session conducted at the beginning of the semester. Guidance on streams should also be put on the website for information of the students.

5. There will also be a set of Social Sciences and Humanities (SSH) courses offered.
6. List of courses, and further information about the courses is available on the website: <https://www.iiitd.ac.in/academics/courses>

4. Requirements for Graduation

For a B.Tech. (CSE) degree, a student must satisfy all the following requirements:

1. Earn a total of 156 (inclusive of 2 credits each of SG/CW credits) credits (equivalent to 39 full courses of 4 credits)
2. Successfully complete all the core courses.
3. Do at least 12 credits of Social Science and Humanities (SSH) Courses.
4. Do 2 credits of Community Work and Self Growth each. These are pass/fail credits, which are required to be completed, and will count for fulfilling the credit requirements.
5. A student may take Online Courses. No more than 8 of these credits can count towards satisfying the credit requirements of the degree.
6. In the last four semesters, a student must complete at least 32 credits of CSE courses. B.Tech. Project /Independent Project/Independent Study/Undergraduate Research will not count towards this requirement. These 32 credits should come from 3xx or above level courses. AAC may approve other relevant courses (e.g., from Math, ECE, Computational Biology, etc.) to be counted as CSE courses for this purpose. Online courses of the respective discipline (i.e., online courses with CSE course code), if done in last four semesters will count towards this requirement.
7. A B.Tech. Project (BTP) is optional. A student opting for BTP, may take a total of 8 to 12 credits of BTP spread over minimum 2 semesters, with no more than 8 credits in a semester. A student not completing BTP credits will have to forgo the partial BTP credits earned earlier and it will not be counted towards the credit requirement of 156 credits.

8. A student may take “Independent Project” or “Independent Study” or “Undergraduate Research” courses for 1, 2, or 4 credits in a semester. No more than 8 of these credits can count towards satisfying the credit requirements of the degree. Only students with satisfactory CGPA (at least 7.5) or with a strong interest in some area (the faculty advisor to determine this) and CGPA of at least 7.0 can take these courses.
9. A student can take maximum 2, 2xx level courses in 3rd and 4th year. The 2xx level core courses listed in Semester 5 or later will not count towards this clause.
10. #A student should do at least one elective course from each of the two slots.- [Math IV/Graph Theory] and [HCI/TOC] (for 2019 batch)/ [Math IV/Graph Theory] [PB/PIS/TOC] (from 2020 batch onwards) positioned in Semester 4

5. Honors Program

The B.Tech. (CSE) program has the Honors option, requirements for which are same as specified in the regulations for the B.Tech. program. Namely;

1. The student must earn an additional 12 discipline credits from in-class courses (i.e. must complete at least 168 credits)
2. The student’s program must include a B.Tech. Project
3. At graduation time, the student must have a CGPA of 8.0 or more

Change History

- **December 2010 release** - Version 2.0: Main changes: Graduation requirements enhanced to 152 (8 more); system management, critical reading, and technical communication were made full 4 unit courses (and the 2 unit course in 4th year on interview skills was removed), and an additional Maths course (4 unit) was added in the second year.
- **April 2012 release** - Version 2.1: This is now stated as requirements for CSE. Math 1 has been made a core course, and TOC has been made an elective. A design course has been introduced as a core course in 2nd semester. The elective slots in 2nd year has been marked as Engineering Science/Maths and it has been clarified that, students can take courses only from the list of courses specified in these slots. Clarified that 2 credits of SG and 2 credits of CW must be done. Clarified that only 4 credits of BTP/IP/IS/UR can be counted for meeting the 8 credits CSE/Math per semester requirement. Clarified that the total credits in first two years is 20 courses, and 18 courses in the last two years. BTP credits range has been changed to 8-12 credits from 16 credits.
- **July 2013 Release**
Preamble modified
Critical reading and Software Engineering removed from core
In 2nd year, it is indicated that TCOM can be done

Math 1 and Math 2 explained

Intro to Engg Design added in 2ndsem as a sequel to System Management

Added the regulation for BTP External

Changed the 8 CSE credits per semester to 32 CSE credits in last four semesters. No IP/IS/BTP credits to count towards this requirement

- **July, 2014 release:** Only a few minor changes done
- **November, 2014 release:** Program Objectives added
- **July, 2015 release:**
 - (i) B.Tech. (CSE) program revised w.e.f. Academic year 2015-16 *
 - (ii) BTP External discontinued
 - (iii) BTP credits towards fulfilment of degree requirements reduced to maximum 12 from maximum 16.
- **July, 2016 release:**
 - (i) Streams in UG program discontinued
 - (ii) Some compulsory requirements in 2nd year elective slots
- **July 2017 release**

*For students of 2014 and earlier batches the set of core courses are shown in the table below (courses mentioned in [] are electives and actual courses for these slots are as defined from semester to semester.)

	Sem 1	Sem 2	Sem 3	Sem 4
Software Stream	Intro to Programming	Data Structures and Algorithms	Advanced Programming	Databases and SQL
Hardware Stream	Digital circuits	Computer organization		
Theory Stream			Discrete Math	Algorithm Design and Analysis
Systems stream	System Management		Operating Systems	Computer Networks
Maths	Math 1 (Linear Algebra)	Math 2 (Probability and Statistics)		
Communications/HSS	Communication Skills	[HSS-1]	[HSS-2]	Technical Communication (2 credits)

Other Courses			[Engineering Science/Math]	Environment studies (2 credits) [Engineering Science/Math]
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- **July 2019 release**

- (i) Counting of SG, CW credits in total credits. Applicable from 2017 batch onwards.
- (ii) Total credits requirement for graduation and credit requirement for Honors students. Applicable from 2017 batch onwards.
- (iii) Courses for Honors students. Applicable from 2017 batch onwards.
- (iv) Discontinuation of BTP to IP conversion. Applicable from AY2019-20.
- (v) Technical Courses
- (vi) 2xx level courses

- **August 2019 release**

- (i) Program structure, Pnt 2.2
- (ii) List of technical and non-technical courses in the first year, pnt 2(B). For students of 2018-2015 batches

Semester	Technical Courses	Non-Technical Courses
Semester 1	Introduction to Programming Digital Circuits Maths I System Management	Communication Skills
Semester 2	Data Structures and Algorithms Basic Electronics Probability and Statistics Introduction to Engineering Design	SSH Elective

- (iii) Requirements for Graduation, Pnt 4(10). Applicable from 2019 batch onwards.

- **January 2021 release**

- (i) Updated program structure from 2020 batch onwards (Pnt 2.2)
- (ii) Creation of Optimization bucket in Semester 6.

- (iii) Clarification regarding 32 credits requirements – counting of 3xx level courses. Applicable from 2019 batch. (Pnt 4.6)
- (iv) Clarification regarding counting of 2xx level courses. (Pnt 4.9)